# THE LICHEN FLORA OF THE PHILIPPINES

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THE LICHEN flora of the Philippines is one of great interest. This, however, is only to be expected from the geographical position of that marvellous archipelago, which is really a northern spur of the East Indies. While the Philippines lie entirely in the monsoon area of the rainy tropics, there is a great variety of ecological conditions within their limits. From the rocky and storm-swept Batanes Islands at the extreme north not far from Formosa, to the Sibutu Islands well down on the east coast of Borneo, there is a range of climates and habitats that ensures a lichen flora that is relatively as large and diversified as that of the flowering plants. The altitudinal range of the many high peaks, reaching up to almost ten thousand feet, adds greatly to the variety and ensures a well represented boreal element in the lichen flora.

The Philippine lichen flora long remained almost unknown. The lichens of Indo-China, Java, Labuan, New Caledonia, and other regions not too remote from the Philippines were more or less well known before 1890.

So far as can be ascertained, the only lichens known from the Philippines before 1909 were those discussed in the following few paragraphs. *Sticta tomentosa* Ach. was collected in 1830 by the distinguished German botanist Meyen; on his trip around the world Meyen was the guest for a month of the noted Paul de la Gironnière at his great estate, Jala Jala, on the north shore of Laguna de Bay. Charles Gaudichaud, a celebrated French botanist, visited Manila on the Bonite in 1836 and collected five lichens: *Ramalina furcellata* (Montagne) A. Zahlbr. var. *torulosa* (Nyl.); *Physcidia callopis* (Meyen & Flot.) Müll. Arg.; *Occllularia concolor* Meyen & Flot. (these three are not mentioned by Wainio and the two following have not been taken since Gaudichaud collected them); *Graphis persicina* Meyen & Flot.; *Opegrapha prosodea* Ach. var. *sclerocarpa* (Meyen & Flot.) Wainio.

The unrivalled English collector, Hugh Cuming, was in the Philippines from 1836 to 1839 and traveled over a large part of the islands. Although his real interest was in conchology, he collected in several other lines of natural history and secured 30 sets of botanical specimens. Among these were 25 species of lichens, as follows:

*Trypethelium anomalum* Ach.; *Trypethelium areolatum* Montagne; *Laurera Cumingi* Mont.; *Phylloporina rufula* (Krempelh.) Müll. Arg. var. *rhodoplaca* Müll. Arg.; *Graphis tenella* Ach.; *Graphina Achari* (Fée) Müll. Arg.; *Graphina Babingtoni* (Mont.) A. Zahlbr.; *Phaeographis chrysenteron* (Mont.) Müll. Arg.; *Phaeo-*

*graphis flexuosa* (Nyl.) Müll. Arg.; *Sarcographa Leprieuri* (Mont.) Müll. Arg.; *Ocellularia Berkeleyana* (Mont.) A. Zahlbr.; *Pannaria lurida* (Mont.) Nyl.; *Pannaria mariana* (E. Fr.) Müll. Arg.; *Coccocarpia pellita* (Lam.) Müll. Arg. var. *incisa* (Pers.) Müll. Arg.; *Physma bursinum* (Ach.) Müll. Arg.; *Leptogium phyllocarpum* (Pers.) Mont.; *Leptogium tremelloides* (Linn. fil.) S. F. Gray, var. *azureum* (Swartz) Nyl.; *Sticta argyracea* Del. var. *aspera* (Laur.) Krempelh.; *Sticta sinuosa* Persoon; *Lecidea piperis* (Spreng.) Nyl.; *Stereocaulon ramulosum* Ach.; *Parmelia relicina* (E. Fries); *Ramalina vittata* Nyl.; *Pyxine sorediata* E. Fries; *Physcia applanata* (Fée) A. Zahlbr.

Of the 25 listed above, ten are not mentioned by Wainio, and a number have never been taken since Cuming obtained them. Apparently the Spanish botanists never collected a Philippine lichen. The 31 species named above were all that were known from the islands until after the Americans came. In talking to Dr. Alexander Zahlbruckner, in 1907, I was urged almost every day to go to the Philippines to collect and study lichens. Always he would say "Aber, es ist eine ganze neue Welt." He believed it was the last considerable area left with a large and diversified lichen flora which was quite unknown.

With the beginning of scientific work by Americans in 1902, the botanists of the Bureau of Science and Bureau of Forestry and their native assistants began to take an active interest in collecting lichens as well as ferns and flowering plants. The botanists most ardent in collecting lichens were E. D. Merrill, C. F. Baker, Mrs. Mary Strong Clemens, E. B. Copeland, H. M. Curran, A. D. E. Elmer, F. W. Foxworthy, and C. B. Robinson. Equally keen in obtaining lichens was the ornithologist R. C. McGregor, while C. M. Weber also collected many. Native assistants who paid special attention to lichens were G. Edaño, Eugenio Fénix, L. Mangubat, and above all M. Ramos. Besides these, other Americans and Filipinos contributed lichens to the herbarium of the Bureau of Science.

The large amount of material collected by them was sent by Dr. E. D. Merrill to the noted lichenologist, Dr. E. A. Wainio, of Helsingfors, Finland. His results were published in four papers, from 1909 to 1923 (2–5). With the appearance of this work of nearly 500 pages of descriptive text, the broad outlines of the Philippines lichen flora were at last set forth. Wainio listed 92 genera and 680 species, besides many varieties, some of them really worthy of specific rank. Adding eleven species collected between 1830 and 1840 and not mentioned by Wainio, as he lacked material for study, 691 species are thus far recorded from the Philippines. Of the 680 species given by Wainio, 441 or 64.85% are new. This is an amazing proportion and well supports Zahlbruckner's statement.

This great ratio of endemism is actually more apparent than real. There is no question but that, when intensive lichen collecting is done in other parts of the oriental tropics from the mainland and Sumatra to New Guinea and the Solomons, the proportion will change. Wainio's

new species will be found in these other regions, just as many supposedly endemic California lichens are now known to occur in adjoining states and even in regions far away.

It is well to note that Wainio's publications are far from presenting a complete conspectus of the Philippine lichen flora. On sea cliffs occur unrecorded species of *Roccella* and other fruticose and crustaceous lichens, while the tablelands of Mindanao show earth-dwelling *Lecideae* and other undescribed lichens. Strange Graphidaceae occur on mossy rocks in the mountain gorges above Dumaguete, and on trees in various regions. Critical examination of rocks would make possible large additions to the lichen flora. In the past rock lichens have either escaped observation or else collectors have not been prepared to remove them from the substratum. It is safe to assume that over 800 species of lichens will ultimately be known from the Philippines. Intensive collecting in the Batanes Islands and on the limestone cliffs and peaks of Palawan should raise the list nearly to that figure. However, optimism must be tempered by a recognition of the destruction by man and its impact on the lichen flora. The rarities obtained by Gaudichaud and Cuming at Manila may be extinct, so great have been the changes during the past century. The conversion of forests to cogonales, and the terrific erosion following caiñgan culture on steep hillsides, may well have brought other lichens to extinction.

The composition of the Philippine lichen flora is in marked contrast to that of the United States or Europe. Naturally it is much like that of the rest of the oriental rainy tropics. But it also has species previously known only from Brazil, Colombia, Peru, the West Indies, and other American localities. Such instances merely indicate how little collecting has been done in the intervening regions. The family best represented is the Graphidaceae. *Graphis* has 39 species, of which 19 are new in Wainio's work, *Graphina* has 33 with 25 new, *Phaeographis* has 26 of which 19 are new, and *Phaeographina* 12 species and eight new. This is a total of 110 species in *Graphis* and its very close allies, which Wainio considered but subgenera.

A botanist new to the Philippines is usually disappointed in the lichen flora. The cities, like those elsewhere, are poor places for lichens, and the interminable rice paddies and sugar cane fields are no better for lichens than the corn and wheat fields of the middle west. Coconut groves are better, but collecting is very poor in the mountain rain forests or the vast jungles of the upper Agusan valley. The pale spots which often cover the trunks of trees in such places are lichens, but their thallus is defective and they never fruit, owing to the excessive moisture and twilight shades of the forest. Mosses, liverworts and ferns thrive much better in such locations. If one is able to leave the gloom below and gain access to the tree tops far above he will find lichens abundant. On the edge of the forest

beside clearings, especially where jakfruit occurs, crustaceous and foliaceous bark lichens are profuse and in great variety. An examination of the leaves of shrubs and trees reveals a wealth of epiphyllous species, often in bewildering variety to the North American or European. No doubt there are numerous unknown leaf lichens awaiting discovery in Philippine forests.

At the same time the islands have lichens well known in Europe and the United States, and when one is encountered it is like meeting an old friend in a place where all is strange. Most of them occur in the mountains or on plateaus, at elevations from 2,000 to over 9,000 feet. Among them are the following: *Microphiale diluta* (Pers.) A. Zahlbr.; *Microphiale lutea* (Dicks.) A. Zahlbr.; *Leptogium azureum* (Sw.) Nyl.; *Pannaria leucosticta* Tuck.; *Pannaria rubiginosa* (Thunb.) Del.; *Sticta aurata* (Ach.); *Sticta crocata* (L.) Ach.; *Peltigera polydactyla* (Neck.) Hoffm.; *Cladonia sylvatica* (L.) Rabenh.; *Cladonia Floerkeana* (E. Fr.) Sommerf.; *Cladonia bacillaris* Nyl.; *Cladonia coccifera* (L.) Willd.; *Cladonia didyma* (Fée) Wainio; *Cladonia furcata* (Huds.) Schrader; *Cladonia squamosa* (Scop.) Hoffm.; *Cladonia gracilis* (L.) Willd; *Cladonia pityrea* (Floerke) E. Fr.; *Cladonia verticillata* Hoffm.; *Pertusaria velata* (Turn.) Nyl.; *Lecanora subfusca* (L.) Ach.; *Haematomma puniceum* (Ach.) Mass.; *Parmelia perlata* (L.) Ach.; *Parmelia cetrata* Ach.; *Usnea florida* (L.) Web.; *Usnea longissima* Ach.; *Usnea trichodea* Ach.; *Physcia picta* (Swartz) Nyl.; *Anaptychia hypoleuca* (Mühlb.) Mass.; *Anaptychia leucomelaena* (L.) Wainio; *Anaptychia speciosa* (Wulf.) Mass. This does not complete the list, and we may expect it to be much extended when the Batanes Islands and the rocks of the high mountains have been thoroughly explored.

The extensive lichen collections of the Bureau of Science, largely named by Wainio but with many named by G. K. Merrill and myself, along with the rare and valuable works on lichens which I selected for the great library, have been maliciously destroyed by Japanese soldiers. The loss to scientific workers in the Philippines is well-nigh irreparable. There is nothing left in the islands of the authoritative material on which Wainio worked so long and painstakingly, nothing with which future collections may be compared. At the request of Dr. E. D. Merrill I prepared sets of Philippine lichens from material examined and named by Dr. Wainio or G. K. Merrill. These sets were distributed by Dr. Merrill to the principal herbaria of the world. Some of these herbaria, as at Berlin, were destroyed during the war, but most of them are intact. These sets contained duplicates, often many, wherever the material permitted. I suggest that it would be a graceful act and an exemplar of true scientific spirit for the curators of the various herbaria to go through these sets of Philippine lichens. From them they can undoubtedly select duplicates of well represented species which can be spared for the purpose of helping rebuild botanical activities in the Philippines.

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